

**UNITED STATES OF AMERICA  
DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
RENTON, WASHINGTON 98055-4056**

In the matter of the petition of

**Bombardier Aerospace**

For an exemption from § 25.785(b) of  
Title 14, Code of Federal Aviation Regulations

**Regulatory Docket No.  
FAA-2002-11998**

**PARTIAL GRANT OF EXEMPTION**

By letter dated March 8, 2002, Michael Williams, DAS Administrator, Bombardier Aerospace, P.O. Box 11186, Tucson, Arizona 85734, petitioned for an exemption from § 25.785(b) of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would permit relief from the general occupant protection requirements for multiple-place side-facing seats on BD-100-1A10 airplanes.

**Section of the Federal Aviation Regulations (FAR) Affected**

Section 25.785(b) requires general occupant protection for occupants of multiple-place side-facing seats that are occupied during takeoff and landing.

**Petitioner's Supportive Information**

“The FAA Memorandum, "Side Facing Seats on Transport Category Airplanes", dated 19 November 1997 and the FAA "Draft Issue Paper: Petition for Exemption", dated 12 November 1997, are recognized as they pertain to side-facing seats. It is noted that these documents specify occupant protection criteria that are in addition to the requirements of 14 CFR 25.562. Body-to-Body Contact, Thoracic Trauma Index (TTI), Lateral Pelvic Acceleration, and Shoulder Strap Loading are additional occupant protection criteria introduced for side-facing seats. These additional occupant protection criteria are consistent with current state-of-the-art pertaining to side-facing seat design and installation certification.

“The FAA Memorandum states, "For multiple occupancy seating, the best criteria available cannot be said to provide an equivalent level of safety for those occupants. Therefore, the only means available for accepting these installations would be through an exemption from the general occupant protection requirements of § 25.785(b). Any petition for exemption must also, of course, address why a grant of the petition would be in the public interest, in accordance with § 11.25(b)(5)". The FAA Memorandum further states that the FAA's Draft Issue Paper for side-facing divans is "guidance material" that can be used to develop project-specific Issue Papers.”

### **Petitioner's Background Information**

“Since the release of the FAA Memorandum and Draft Issue Paper in 1997, the industry has made substantial progress in the field of multi-place side-facing seat design and installation certification. Single and multiple occupancy side-facing seat installations have been and are being certified for derivative and fully compliant aircraft. Project specific Issue Papers and Exemptions have been developed to establish the unique certification bases for these side-facing products due to the lack of published regulations. For side-facing seats designed for installation into a fully compliant aircraft such as the Bombardier Aerospace Model BD100, an Issue Paper is prescribed to provide the technical path for establishing the product certification basis. This Issue Paper is then incorporated into a Petition for Exemption to 14 CFR 25.785(b). The Exemption, once granted, provides the certification path for the side-facing seat manufacturer and installer.

“Past industry experience has led to the development of multi-place side-facing seat certification criteria more advanced than what was originally presented by the FAA in 1997. These criteria are specifically suited to assess the structural capabilities of the side-facing seats separate from the occupant protection capabilities governed by the installations. Furthermore, they provide a means of creating installation limitations to be used by the seat installers when configuring the aircraft cabin interiors. These installation limitations provide the means to assess the potential effects on occupant protection pertaining to the varying cabin arrangements. The proposed certification criteria are presented below to establish an acceptable level of safety for side-facing seats and their installations. Some of the proposed certification criteria have been previously recognized by the FAA (see Reference 2) as being appropriate, Equivalent Level of Safety, in lieu of the original guidance criteria released in the 1997 Memorandum cited above.”

## **Petitioner's Proposed Side-Facing Seat Certification Criteria**

- “1) Side-facing seats must meet the provisions of 14 CFR 25.562, Amendment 25-64, all sections. HIC assessments are only required for head contact with the seat and/or adjacent structures.
- “2) Body-to-Body Contact: Contact between the head, pelvis, or shoulder area of one Anthropomorphic Test Dummy (ATD) with an adjacent seated ATD is not allowed during the tests conducted in accordance with 14 CFR 25.562(b)(1) and (b)(2). Incidental contact of the legs, feet, arms, and hands that will not result in incapacitation of the occupants is acceptable. Contact between adjacent ATDs is acceptable during rebound.
- “3) Body-to-Wall / Furnishing Contact: If the seat is installed aft of a structure, such as an interior wall or furnishing, that would contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, then a conservative representation of the structure and its stiffness must be included in testing. In most cases, the representation of the structure would be more rigid and have less deflection under load than the actual installation on the airplane. There is no specific requirement to pad the structure provided the applicable occupant protection criteria are satisfied.
- “4) Thoracic Trauma: Thoracic Trauma Index (TTI) injury criteria must be less than 85, as defined in 49 CFR part 572, subpart F. TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS), part 571.214, section S6.13.5.
- “5) Pelvis: Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS, part 571.214, section S6.13.5.
- “6) Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for the side-facing seat occupants, the tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.
- “7) Occupant Retention / End Closures: For the occupant seated in the forward-most seating position of a single or multi-place side-facing seat, the pelvis must not translate past the structural forward edge of the seat when subjected to the dynamic test pulse prescribed in 14 CFR 25.562(b)(2). Substantiation per this requirement eliminates the need for an end closure. Should the forward-most occupant's pelvis move past the structural end plane of the side-facing seat, an end closure is required to provide occupant retention. An end closure can be any interior component such as an armrest cabinet, partition, wardrobe, etc. which need not be attached to the seat itself. Any end closures required for occupant

retention must be assessed for occupant protection per the criteria established herein.

“8) Occupant Movement Envelope (OME): An Occupant Movement Envelope must be established for each occupant seated on the side-facing seat installation. The OME must encompass the greatest movement of the ATD head, leading shoulder, torso, and pelvis when subjected to a test pulse per 14 CFR 25.562(b)(2). It must be increased in size to account for a range of occupant sizes through a 95th percentile male occupant. Any interior component installed within the OME must be assessed for occupant protection per the criteria established herein.

“9) Required Structural Tests: The following structural tests are required for each unique side-facing seat design. All seat positions are to be occupied for testing.

“a. Quantity one 14g minimum vertical test per 14 CFR 25.562(b)(1) with Hybrid II ATD(s). End closures need not be present if not directly attached to the side-facing seat structure.

“b. Quantity one 16g minimum longitudinal test per 14 CFR 25.562(b)(2) with Hybrid II ATD(s). End closures need not be present unless directly attached to the side-facing seat structure. This is the worst case structural test condition for the side-facing seat.

“c. To establish the OME, quantity one 16g minimum longitudinal test per 14 CFR 25.562(b)(2) without floor deformation, with zero degree yaw, and with Hybrid II ATD(s). Note that Occupant Retention per 7) above may be assessed during this test to determine if end closures are required to retain the occupant.

“10) Installation Testing: Should end closures be installed within the OME, substantiation of the body interaction and occupant protection criteria is warranted. To assess TTI, an appropriate Side Impact Dummy may be used that is capable of registering a TTI value. Hybrid II ATDs may be used to assess Occupant Retention, Body-to Body Contact, Lateral Pelvic Acceleration, and HIC. The required installation testing is governed by each unique cabin arrangement. When substantiating TTI via an actual dynamic test with a Side Impact Dummy, a body-to-body contact assessment can also be made during this test using the Side Impact Dummy. An additional test with a Hybrid II ATD is not required to assess the body-to-body contact for this installation. Installation testing should be conducted as follows to evaluate each unique installation:

“a. 16g minimum longitudinal test per 14 CFR 25.562(b)(2) with a Side Impact Dummy in the seating position that predicts contact with the end

closure/interior component and Hybrid II ATDs in all other positions. No floor deformation, zero or ten degrees yaw to induce critical contact with the component being evaluated for occupant protection. End closures present.”

### **Petitioner’s Public Interest Statement**

“Bombardier Aerospace is a major corporation employing a large domestic staff whose livelihood depends on the sale of executive aircraft. Granting this exemption will allow for side-facing seats to be installed on the Model BD-100 aircraft and occupied for takeoff & landing. This allows the aircraft to be equivalent to the competition and attractive for sale to the corporate and private customer, thus protecting the livelihoods of the Bombardier Aerospace employees and the people who maintain these aircraft in service.

“Should this petition be denied, it will introduce a definite competitive disadvantage for the BD-100 aircraft. This will make the aircraft less attractive for purchase and again affect the livelihood of the tax paying employees. Furthermore, the customers of the Model BD-100 will not be able to enjoy the interior flexibility of having side-facing seat installations which have become a mainstay for corporate and private aircraft.

“The certification and occupant protection criteria included in this petition are considered state-of-the-art. Denial of this petition may force potential customers to purchase older aircraft and/or aircraft that are not subject to these enhanced criteria just to obtain the convenience of a side-facing seat for their flight operation. This would result in a negative impact on occupant safety which is not in the best interests of the public.”

### **Petitioner’s Conclusion**

“Bombardier Aerospace has researched previous grants of exemption for similar seating products and aircraft. Bombardier Aerospace has contracted the services of Oleson Technologies, Inc. (OTI) to provide technical assistance for the certification and occupant protection criteria for the seating products based on OTI's experience with side-facing seat certification for previous aircraft. The certification approach separates the structural testing from the installation testing to allow for various installations to be certified (much like that established for forward and aft facing seat certification). Finally, the testing and certification approach proposed is believed to establish a sound approach to the certification of these products to ensure the maximum occupant safety. Bombardier Aerospace requests of the FAA to not limit the occupancy of these products based on the operational classification of the aircraft so as to be consistent with grants of exemption for competitive aircraft.”

### **Notice and Public Procedure Provided**

A summary of the petition was published in the Federal Register on April 16, 2002. No comments were received.

### **FAA's Analysis of the Petition**

The applicant's petition letter requested exemption from 14 CFR 25.785(b) Amendment 25-64. The FAA assumes, however, that the petitioner meant to reference 14 CFR 25.785(b) Amendment 25-88, because that is the amendment level at which the Bombardier Model BD-100-1A10 series airplanes will be certificated. The applicant's petition for exemption from § 25.785(b) is based on the FAA memorandum "Side-Facing Seats on Transport Category Airplanes," dated November 19, 1997. This memorandum and its attached issue paper provide dynamic test conditions and pass/fail criteria for side-facing seats on transport category airplanes.

- (1) The dynamic test conditions criteria. In terms of both pulse severity and types of tests currently required, the criteria in § 25.562 are also considered directly applicable to side-facing seats. While it is true that the regulation was written with forward- and aft-facing seats in mind, the orientation of the seat does not change the relevant test conditions.
- (2) The pass/fail criteria. For these criteria, however, the orientation of the seat may be significant. Injury criteria are currently limited to head, spine, and femur loads. Head impact is evaluated for contact experienced by the head against any aircraft interior installations, and the pass/fail criterion is based on the resultant head acceleration considering all axes of head motion. The lumbar spinal load is an axially compressive load that is primarily evaluated during the 14g, 60 degree test. The femur load is also compressive, and actually has not proved to be critical thus far. For a side-facing seat, other injury parameters may predominate such that evaluation of those parameters may be necessary to provide an acceptable level of safety.

The first consideration for a side-facing seat is the isolation of one occupant from another. That is, occupants should not rely on the impact with other occupants to provide energy absorption; body-to-body impacts are considered unacceptable.

The second consideration for a side-facing seat is the retention of occupants in the seat and restraint system. Addressing this concern may necessitate providing a means of restraint for the lower limbs as well as the torso. Failure to limit the forward (in the airplane's coordinate system) travel of the lower limbs can cause the occupant to come out of the restraint system or produce severe injuries due to the resulting position of the restraint system, and/or twisting (torsional load) of the lower lumbar spinal column.

The third consideration for a side-facing seat is limiting the load exerted on the torso in the lateral direction, where human tolerance differs from that for the forward- or aft-facing directions and where potential injury mechanisms exist. The automotive industry has developed test procedures and occupant injury criteria appropriate for side impact conditions. Their criteria involve limitation of lateral pelvic accelerations and use of the human tolerance parameter "Thoracic Trauma Index," which is defined in 49 CFR 571.214. Use of the 49 CFR 572, subpart F, Side Impact Dummy (SID), rather than the 49 CFR 572, subpart B, Hybrid II Dummy used in the 14 CFR 25.562 test, is required to evaluate these parameters. This is the best means available, at present, to assess the injury potential of a sideward impact condition. Such an evaluation is considered necessary to provide an acceptable level of safety for these types of seats.

Other potential injury mechanisms appropriate for aircraft seats may exist. However, due to the lack of useful injury criteria for those other potential injury parameters, such as neck loads and lower limb flail, the FAA is not able to specify criteria applicable to those areas at this time. The FAA considers that such criteria may be appropriate, particularly for multiple occupancy installations, and intends to pursue their further development.

For multiple occupancy seating, the best criteria currently available cannot be said to provide an equivalent level of safety for those occupants. Therefore, the only vehicle available for accepting these installations would be through an exemption from the general occupant protection requirements of § 25.785(a) prior to Amendment 25-72, or § 25.785(b) after Amendment 25-72.

The following summary of the criteria from the FAA draft issue paper "Dynamic Test Requirements for Side-Facing Divans (Sofas)," dated November 12, 1997 (an attachment to FAA memorandum "Side Facing Seats on Transport Category Airplanes," dated November 19, 1997), provides the basis of the petition for exemption.

1. Proposed Injury Criteria

- (a) Existing Criteria: All injury protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupants of side-facing seating. Head injury criteria (HIC) assessments are only required for head contact with the seat and/or adjacent structures.
- (b) Body-to-Body Contact: Contact between the head, pelvis, or shoulder area of one seated Anthropomorphic Test Dummy (ATD) and the adjacent seated ATDs is not allowed to occur during the test conducted in accordance with § 25.562(b)(1) and (b)(2). Incidental contact of the legs, feet, arms, and hands that will not result in incapacitation of the occupants is acceptable. Contact during rebound is allowed.

- (c) Body-to-Wall/Furnishing Contact: If the sofa is installed aft of a structure such as an interior wall or furnishing that may contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, then a conservative representation of the structure and its stiffness must be included in the tests. The contact surface of this structure must be covered with at least two inches of energy absorbing protective foam, such as ensolite.
- (d) Thoracic Trauma: Testing with a Side Impact Dummy (SID), as defined by 49 CFR part 572, subpart F, or its equivalent, must be conducted and Thoracic Trauma Index (TTI) injury criteria measurement acquired with the SID must be less than 85, as defined in 49 CFR part 572, subpart F. Side impact dummy TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) part 571.214, section S6.13.5.
- (e) Pelvis: Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS part 571.214, section S6.13.5.
- (f) Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for sofa occupants, tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.

## 2. General Guidelines

- (a) All side-facing seats require end closures.
- (b) All seat positions need to be occupied for the longitudinal tests.
- (c) For the longitudinal tests, conducted in accordance with the conditions specified in § 25.562(b)(2), a minimum number of tests will be required as follows:
  - (1) One test will be required with one SID ATD in the forwardmost position and Hybrid II ATD(s) in all other positions, with undeformed floor, no yaw, and with all lateral supports (armrests/walls).
  - (2) One test will be required with one SID ATD in the center seat and Hybrid II ATD(s) in all other positions, with deformed floor, 10 degrees yaw, and with all lateral supports (armrests/walls). This could be considered the structural test as well.



- (d) For the vertical test, conducted in accordance with the conditions specified in § 25.562(b)(1), Hybrid II ATDs will be used in all seat positions.

The petitioner has proposed several changes to the criteria for the certification of side-facing seats. One of these changes eliminates the requirement for two inches of padding on contact surfaces installed forward of side-facing seats. The FAA concurs that a contact surface without padding that meets the requirements of TTI, lateral pelvic acceleration, and HIC provides an acceptable level of safety for an exemption. However, the petitioner did not address the issue of different contact points on the contact surface. The area contacted by an occupant could be more rigid than the area contacted during the test. Therefore, the petitioner must demonstrate that the contact surface is homogeneous. If the petitioner demonstrates that the contact surface is homogeneous and the requirements of TTI, lateral pelvic acceleration, and HIC are met, the 2-inch padding requirement for contact surfaces installed forward of side-facing seats could be eliminated.

The petitioner proposes that end closures at the forward end of divans not be required and, if end closures exist, that structural substantiation not be required for end enclosures that are not attached to the seat. We partially concur, and will modify the criteria so that the petitioner may supply either an end closure or some other means of restraint to prevent the occupant from moving laterally off the seat. However, end closures that are attached to the seat and end closures not attached to the seat that are required to restrain an occupant must meet the structural requirements of § 25.562.

The petitioner's proposal is applicable to multiple-place divan installations comprised of single and multiple-place divans installed adjacent to one another. The petitioner would need to demonstrate by test that there is no interaction between individual seats. Without this testing the FAA cannot accept the petitioner's proposal to test the divans as individual seat modules.

The petitioner has proposed to establish an occupant movement envelope (OME) for each occupant seated on a side-facing divan installation. As discussed above, the development of the OME must demonstrate by test that there is no interaction between individual seats and occupants. Without this testing the FAA cannot accept the petitioner's proposal to test divans as individual seat modules and to use OMEs. Since the petitioner has not provided this data, the FAA cannot accept the proposal at this time. However, if the petitioner can provide the data to support their proposal, the concepts of modular seating and OME could be used for follow-on certification efforts without the need to revise this exemption.

For TTI, the petitioner has proposed that use of a SID, or its equivalent, not be required. The FAA concurs that use of a SID, or its equivalent, may not be required, but a test dummy suitable for measuring TTI is required when those

measurements are required. If there is torso contact of an occupant at the forwardmost seat place during testing, TTI measurement must be taken and must meet the criteria. This requirement is applicable to the forwardmost seat place of each individual seat module. However, TTI measurements are not needed for other seat places (for example center or aft seat places) or if there is no contact with the occupant's torso at the forwardmost seat place. Also note that torso contact during rebound is acceptable and TTI need not be measured for this case.

The petitioner has proposed that the longitudinal test for occupant injury consideration be conducted with zero or 10 degrees of yaw induced to yield critical occupant contact with the component(s) being evaluated for occupant protection. The FAA concurs with the petitioner's proposal.

The petitioner has proposed that it be acceptable to assess the "no body-to-body contact" criterion using SIDs. A SID has a shoulder constructed of soft foam. This causes the seat belt to penetrate several inches into a SID's shoulder during tests where the SID's movement is not limited by a lateral support (wall/furnishing). During this case a SID's movement is not representative of an occupant's movement and cannot be used for assessing body-to-body contact.

The "no body-to-body contact" criterion does not allow incidental contact of a leg, foot, arm, or hand that would result in incapacitation of an occupant. Incidental contact of a leg, foot, arm, or hand has not been a concern during testing that has occurred since the 1997 policy memorandum was issued, and the FAA finds that this requirement is no longer warranted as a limitation. Note that contact between the head, pelvis, or shoulder area of adjacent ATDs is still considered unacceptable.

The FAA may refine the compliance criteria for multiple occupancy side-facing seating to establish an equivalent level of safety. This may include additional injury criteria related to neck loads or other injury mechanisms. The guidance will be updated accordingly, and the certification of multiple occupancy seating may be processed with special conditions in lieu of exemptions. For this reason, the FAA does not agree with the petitioner's request for exemption for all Bombardier BD-100-1A10 airplanes. The FAA will grant an exemption that will cover only airplanes that are manufactured for a specific amount of time. During this time, the FAA may refine the compliance criteria for multiple occupancy side-facing seating.

For the purposes of this exemption, the "date of manufacture" is the date on which inspection records show that an airplane is in a condition for safe flight. This is not necessarily the date on which the airplane is in conformity with the approved type design, or the date on which a certificate of airworthiness is issued. It could be earlier, but would be no later, than the date on which the first flight of the airplane occurs.

## **Grant of Exemption Determination**

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest and will not affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in § 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator (14 CFR 11.53), Bombardier Aerospace is hereby granted a partial exemption from the requirements of 14 CFR 25.785(b) for the general occupant protection requirements for occupants of multiple-place side-facing seats that are occupied during takeoff and landing on Bombardier Aerospace BD-100-1A10 airplanes manufactured prior to January 1, 2004.

The following limitations apply to this exemption:

1. Existing Criteria: All injury protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupants of side-facing seating. The HIC assessments are only required for head contact with the seat and/or adjacent structures.
2. Body-to-Body Contact: Contact between the head, pelvis, or shoulder area of one Anthropomorphic Test Dummy (ATD) with the adjacent seated ATDs is not allowed during the tests conducted in accordance with § 25.562(b)(1) and (b)(2). Any contact between adjacent ATDs is acceptable during rebound.
3. Body-to-Wall/Furnishing Contact: If the side-facing divan is installed aft of a structure, such as an interior wall or furnishing, that would contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, then a conservative representation of the structure and its stiffness must be included in the tests. In most cases, the representation of the structure would be more rigid and have less deflection under load than the actual installation on the airplanes. The contact surface of this structure must be covered with at least 2 inches of energy absorbing protective foam, such as ensolite. However, if the test was conducted without the 2-inch padding and met the TTI, lateral pelvic acceleration, and HIC requirements, and the applicant demonstrated that the contact surface was homogeneous, the 2-inch padding requirement for contact surfaces installed forward of the side-facing seat could be eliminated.
4. Thoracic Trauma: Thoracic Trauma Index (TTI) injury criteria measurements must be less than 85, as defined in 49 CFR part 572, subpart F. TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS), part 571.214, section S6.13.5. Should torso contact of an occupant at the forwardmost seat place occur during testing, TTI must be substantiated by dynamic test or rationale based upon previous testing of a similar design/installation. If it can be shown from known occupant movement data that the torso of an occupant at the forwardmost seat place will not be

contacted in conditions up to the maximum test load, a TTI measurement is not required based on this absence of torso contact. This requirement is applicable to the forwardmost seat place of each individual seat module. Torso contact during rebound is acceptable and need not be measured.

5. Pelvis: Lateral pelvic acceleration for all side-facing occupants must be substantiated if there is pelvic contact during testing. Should occupant pelvic contact occur, lateral pelvic acceleration must be substantiated by dynamic test or rationale based on previous dynamic testing of a similar design/installation. When conducting an actual test to obtain a lateral pelvic acceleration value, an appropriate test device capable of recording such a value should be used. Pelvic acceleration data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) Part 571.214, Section S6.13.5. Pelvic lateral acceleration must not exceed 130g.
6. Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for sofa occupants, the tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.
7. Seat Positions: All seat positions need to be occupied by ATDs for the longitudinal tests.
8. Occupant Retention: All side-facing seats require end closures or other means to prevent the occupant from moving laterally off the end of the seat.
9. Longitudinal Tests: For the longitudinal tests conducted in accordance with the conditions specified in § 25.562(b)(2), a minimum number of tests will be required as follows:
  - a. One test will be required with ATDs in all positions, with undeformed floor and with all lateral supports (armrests/walls). Zero degrees of yaw must be used for establishing an OME. Zero or 10 degrees of yaw must be induced to yield critical occupant contact with the component(s) being evaluated for occupant protection. For configurations with a wall or bulkhead immediately forward of the forward seat position of the divan, a SID or equivalent ATD will be used in the forward seat position and a Hybrid II ATD(s) or equivalent will be used for all other seat locations. This is the case when lateral supports are within the OME. For configurations without a wall or bulkhead immediately forward of the forward seat, Hybrid II ATDs or equivalent will be used in all seat locations.
  - b. One test will be required with Hybrid II ATDs or equivalent in all positions, with deformed floor, 10 degrees yaw, and with all lateral

supports (armrests/walls). This could be considered the structural test as well.

10. Vertical Test: One test will be required conducted in accordance with the conditions specified in § 25.562(b)(1). Hybrid II ATDs or equivalent will be used in all seat positions.

Issued in Renton Washington, on September 16, 2002.

/s/Kalene C. Yanamura

---

Kalene C. Yanamura

Acting Manager

Transport Airplane Directorate

Aircraft Certification Service